argininosuccinic aciduria

Argininosuccinic aciduria is an inherited disorder that causes ammonia to accumulate in the blood. Ammonia, which is formed when proteins are broken down in the body, is toxic if the levels become too high. The nervous system is especially sensitive to the effects of excess ammonia.

Argininosuccinic aciduria usually becomes evident in the first few days of life. An infant with argininosuccinic aciduria may be lacking in energy (lethargic) or unwilling to eat, and have poorly controlled breathing rate or body temperature. Some babies with this disorder experience seizures or unusual body movements, or go into a coma. Complications from argininosuccinic aciduria may include developmental delay and intellectual disability. Progressive liver damage, skin lesions, and brittle hair may also be seen.

Occasionally, an individual may inherit a mild form of the disorder in which ammonia accumulates in the bloodstream only during periods of illness or other stress.

Frequency

Argininosuccinic aciduria occurs in approximately 1 in 70,000 newborns.

Genetic Changes

Mutations in the *ASL* gene cause argininosuccinic aciduria.

Argininosuccinic aciduria belongs to a class of genetic diseases called urea cycle disorders. The urea cycle is a sequence of reactions that occur in liver cells. It processes excess nitrogen, generated when protein is used by the body, to make a compound called urea that is excreted by the kidneys.

In argininosuccinic aciduria, the enzyme that starts a specific reaction within the urea cycle is damaged or missing. The urea cycle cannot proceed normally, and nitrogen accumulates in the bloodstream in the form of ammonia.

Ammonia is especially damaging to the nervous system, so argininosuccinic aciduria causes neurological problems as well as eventual damage to the liver.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- Argininosuccinate lyase deficiency
- argininosuccinic acidemia
- Argininosuccinicaciduria
- argininosuccinyl-CoA lyase deficiency
- arginosuccinase deficiency
- ASA
- ASAuria
- ASL deficiency

Diagnosis & Management

These resources address the diagnosis or management of argininosuccinic aciduria:

- Baby's First Test
  http://www.babysfirsttest.org/newborn-screening/conditions/argininosuccinic-aciduria
- GeneReview: Argininosuccinate Lyase Deficiency
  https://www.ncbi.nlm.nih.gov/books/NBK51784
- GeneReview: Urea Cycle Disorders Overview
  https://www.ncbi.nlm.nih.gov/books/NBK1217
- Genetic Testing Registry: Argininosuccinate lyase deficiency
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0268547/
- MedlinePlus Encyclopedia: Hereditary urea cycle abnormality
  https://medlineplus.gov/ency/article/000372.htm
- National Organization for Rare Disorders (NORD) Physician Guide: Urea Cycle Disorders
  http://nordphysicianguides.org/urea-cycle-disorders/
- New England Consortium of Metabolic Programs: Acute Illness Protocol
  http://newenglandconsortium.org/protocols/acute_illness/urea_cycle_disorders/argininosuccinic-acid-lyase-def.pdf

These resources from MedlinePlus offer information about the diagnosis and management of various health conditions:

- Diagnostic Tests
  https://medlineplus.gov/diagnostictests.html
- Drug Therapy
  https://medlineplus.gov/drugtherapy.html

- Surgery and Rehabilitation
  https://medlineplus.gov/surgeryandrehabilitation.html
- Genetic Counseling
  https://medlineplus.gov/geneticcounseling.html
- Palliative Care
  https://medlineplus.gov/palliativecare.html

Additional Information & Resources

MedlinePlus

- Encyclopedia: Hereditary urea cycle abnormality
  https://medlineplus.gov/ency/article/000372.htm
- Health Topic: Amino Acid Metabolism Disorders
  https://medlineplus.gov/aminoacidmetabolismdisorders.html
- Health Topic: Genetic Brain Disorders
  https://medlineplus.gov/geneticbraindisorders.html
- Health Topic: Newborn Screening
  https://medlineplus.gov/newbornscreening.html

Genetic and Rare Diseases Information Center

- Argininosuccinic aciduria
  https://rarediseases.info.nih.gov/diseases/5843/argininosuccinic-aciduria

Educational Resources

- Disease InfoSearch: Argininosuccinic Aciduria
  http://www.diseaseinfosearch.org/Argininosuccinic+Aciduria/576
- Genetics Education Materials for School Success (GEMSS)
  http://www.gemssforschools.org/conditions/urea-cycle/default
- MalaCards: argininosuccinic aciduria
  http://www.malacards.org/card/argininosuccinic_aciduria
- My46 Trait Profile
  https://www.my46.org/trait-document?trait=Argininosuccinic%20aciduria&type=profile
- Orphanet: Argininosuccinic aciduria
  http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=23
- Screening, Technology and Research in Genetics
  http://www.newbornscreening.info/Parents/aminoaciddisorders/ASAL.html

- Vanderbilt Children's Hospital
  http://www.childrenshospital.vanderbilt.org/uploads/documents/mgarginino succinic_aciduria.pdf
- Virginia Department of Health
  http://www.vdh.virginia.gov/content/uploads/sites/33/2016/11/Parent-Fact-Sheet_ASA_English.pdf

Patient Support and Advocacy Resources

- Children Living with Inherited Metabolic Diseases
  http://www.climb.org.uk/
- National Organization for Rare Disorders (NORD)
  https://rarediseases.org/rare-diseases/argininosuccinic-aciduria/
- National Urea Cycle Disorders Foundation
  http://www.nucdf.org/
- Urea Cycle Disorders Consortium
  http://www.rarediseasesnetwork.org/cms/ucdc/Learn-More/Disorder-Definitions

GeneReviews

- Argininosuccinate Lyase Deficiency
  https://www.ncbi.nlm.nih.gov/books/NBK51784
- Urea Cycle Disorders Overview
  https://www.ncbi.nlm.nih.gov/books/NBK1217

Genetic Testing Registry

- Argininosuccinate lyase deficiency
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0268547/

ACT Sheets

- Increased Citrulline
  https://www.ncbi.nlm.nih.gov/books/NBK55827/bin/Citrullinemia.pdf

ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22argininosuccinic+aciduria%22+OR+%22amino+acid+metabolism%2C+inborn+errors%22

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28argininosuccinic+aciduria%5BTIAB%5D%29+OR+%28argininosuccinate+lyase+deficiency%5BTIAB%5D%29+OR+%28asl+deficiency%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+2160+days%22%5Bdp%5D

OMIM

- ARGININOSUCCINIC ACIDURIA
  http://omim.org/entry/207900

Sources for This Summary

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  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/15465784
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